MULTIMEDIA UNIVERSITY*

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2022/2023 (TERM ID 2210)

HPB2021 –BIOINFORMATICS PROGAMMING II

(All sections / Groups)

14 FEBRUARY 2023
2.30 pm – 4.30 pm
(2 hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 3 pages, including this cover page.
2. You are required to attempt all questions. All questions carry equal marks (10).
3. Write all your answers in the Answer Booklet provided.
4. You may use a calculator.

Question 1

a) Write the output of the following codes, considering they are coded in Python version 3.xx: [5 marks]

i)
```
n=2
for x in [2,5,8]:
    n=n+x
print(n)
```

ii)
```
print("4"+2)
```

iii)
```
x="HelloWorld"
print(x[2:-2])
```

iv)
```
x=(3,4,5)
y=3*x
print(y)
```

v)
```
x = [[3,4,5],[7,4,2]]
y = [[4,2,6],[2,4,4],[6,3,4]]
print(x[1][2]*y[2][1])
```

b) Write a Python (version 3) script to [5 Marks]

i) accept file as a user input

ii) check for the following substrings:
EcoRI = 'gaattc'
BamHI = 'ggatcc'
HindIII = 'aagctt'

iii) output respective start and end positions (not just position of first characters) of the substrings from the input file

iv) count the total substrings in the file, inclusive of repetitions in the file.

Question 2

a) Use Python to code a bank account system. The code should comprise of:

i) two classes, namely: **Open_account and Close_account**

ii) Methods for each class to achieve: **account holder name; ID; phone number**

iii) creation of **constructor** for each open or close account

iv) Check if account is available before opening an account

[10 Marks]

Continued .....

Question 3

a) Read all the sequences in a FASTA formatted file "example.fa" using BioPython.
- Display the longest sequence in the file
- ID of the longest sequence
- The length of the longest sequence [5 marks]

b) Write BioPython code to translate **vertebrate mitochondria** sequence from nucleotides to amino acids. The code should:
- accept user input
- create a Seq object using the IUPAC.unambiguous_dna alphabet
- Translate the sequence [5 marks]

Question 4

a) What is the difference between array and matrix. [1mark]

b) Given x<-matrix(c(4,5,-5,1,8,3),nrow=3,byrow=T) and y<-matrix(c(2, 3,5,1),nrow=2,byrow=T) write the output when:

```
>x
>y
> x%*%y
```
[4 marks]

b) Write an R code to receive a ";" delimited csv file from user and plot a graph by using *qplot* function. *qplot* is a function in the *ggplot2* package. Prior calling the *qplot*, install and import the package *ggplot2*. [5 marks]

END OF PAPER